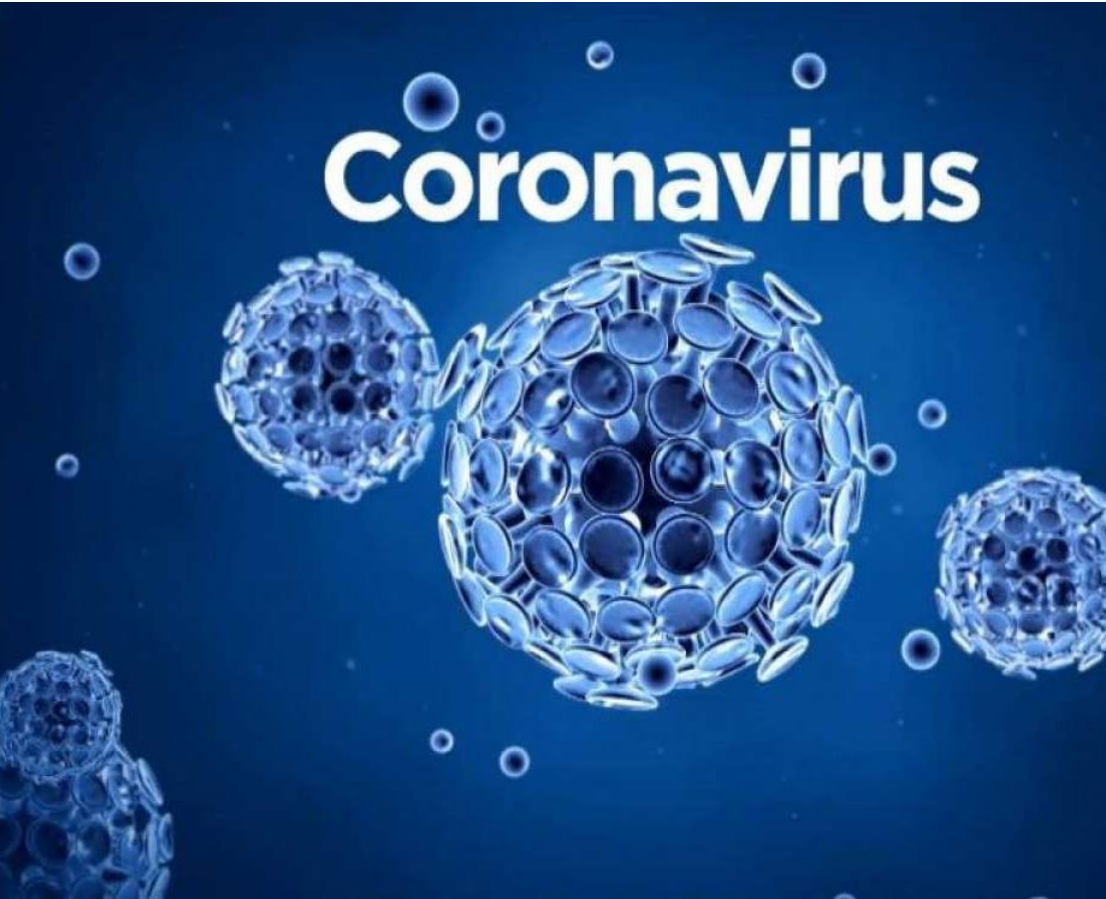


## Dr Latha Anandakrishna MDS, PhD, PGDMLE, Faimer Fellow

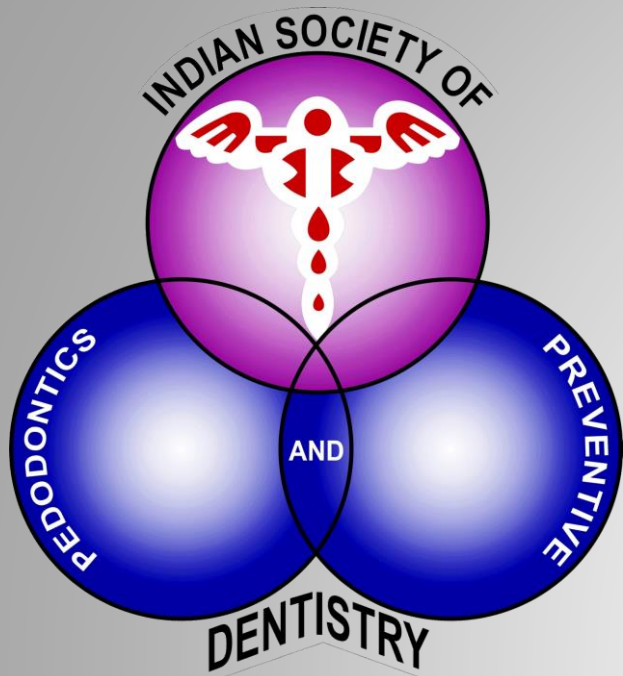
- Alumnus of both GDC, Bangalore and ABSMIDS. Mangalore.
- Post Graduate Diploma in Medical Law and Ethics from NLSIU, Bangalore.
- PhD on “Association between early childhood caries and problematic eating behavior in children” from Nitte University.
- Currently pursuing Fellowship in Medical education from Faimer Institute, Philadelphia, USA
- Currently working as Professor in the Department of Pediatric Dentistry and Associate Dean for Post Graduate studies at Faculty of Dental Sciences, Ramaiah University of Applied Sciences, Bangalore.
- Several papers to her credit and is an invited speaker in dentistry in many forum and passionate about her specialty especially Cariology and Medical Education.

# Coronavirus



# Preventive dentistry works and every time





# PREVENTION AND NON-OPERATIVE CARE IN ECC: A NECESSITY

By

Prof. Dr Latha Anandakrishna MDS, PhD

Associate Dean(PG)

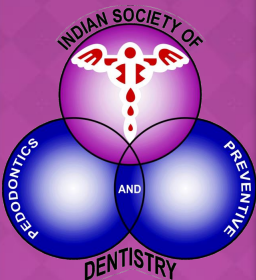
Faculty of Dental Sciences, MSRUAS

Bangalore

Email: [latha.pe.ds@msruas.ac.in](mailto:latha.pe.ds@msruas.ac.in) / [drlatha74@gmail.com](mailto:drlatha74@gmail.com)

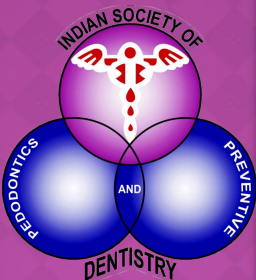
# LEARNING OBJECTIVES

- At the end of this session, the post graduate will be able to
  - Review pit and fissure sealants as non operative option for ECC
  - Summarise the effectiveness of fluorides in caries prevention
  - Recognise the role of non fluoride remineralisation systems in caries prevention
  - Describe the importance of caries detection aids in treatment protocol for ECC



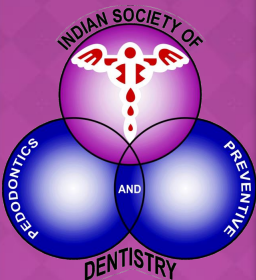
# CONTENTS

- Pit and fissure sealants
- Remineralising systems
  - Fluoride systems
  - Non fluoride systems
  - Natural extracts
- Caries detection Aids
  - Radiographic methods
  - Non Radiographic methods



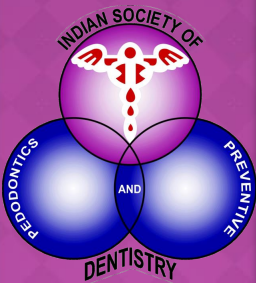
# PIT AND FISSURE SEALANTS

- Rationale
- Classification
- Evolution of materials
- Criteria for evaluation
- Scientific evidence
  
- *Ahovuo-Saloranta A, Hiiri A, Nordblad A, Mäkelä M, Worthington HV. Pit and fissure sealants for preventing dental decay in the permanent teeth of children and adolescents. Cochrane Database of Systematic Reviews. 2008(4).*
- *Simonsen RJ, Neal RC. A review of the clinical application and performance of pit and fissure sealants. Australian dental journal. 2011 Jun;56:45-58.*



# REMINERALISING SYSTEMS

- ◉ Fluoride systems
- ◉ Non Fluoride Systems
- ◉ Natural extract





# FLUORIDE REMINERALISING SYSTEMS

## Self administered

### Systemic

- Water
- Salt
- Milk
- Tablets/drops
- Lozenges

### Local

- Toothpastes
- Mouthrinses
- Floss
- Chewing gums

## Professionally Applied

### Topical fluorides

- Sodium Fluoride
- Stannous Fluoride
- APF solution and Gel

### Fluoride Varnishes

### Restorative materials

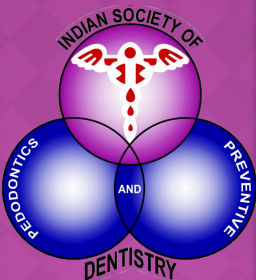
### Misc

# FLUORIDE REMINERALISING SYSTEMS

- History
- Mechanism of Action
- Important studies with clinical findings
  - International
  - National

*Murray JJ, Naylor MN. Fluorides and dental caries. The prevention of oral disease. 1996;3:32-67.*

*Wei SH, editor. Clinical Uses of Fluorides: A State of the Art Conference on the Uses of Fluorides in Clinical Dentistry: May 11 and 12, 1984, Holiday Inn, Union Square, San Francisco, California. Lea & Febiger; 1985.*



# FLUORIDE VARNISH



- History
  - Mechanism of action
  - Products available
  - Protocols for application
  - Scientific evidence for application
  - Guidelines
- 
- *Marinho VC, Worthington HV, Walsh T, Clarkson JE. Fluoride varnishes for preventing dental caries in children and adolescents. Cochrane Database of Systematic Reviews. 2013(7).*
  - *Seppä L. Fluoride varnishes in caries prevention. Medical Principles and Practice. 2004;13(6):307-11.*
  - *Bonetti D, Clarkson JE. Fluoride varnish for caries prevention: efficacy and implementation. Caries research. 2016;50(Suppl. 1):45-9.*

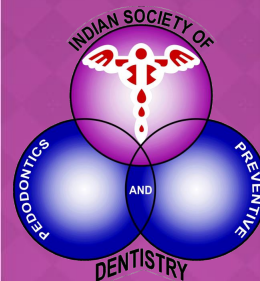
# FLUORIDE VARNISH

**Table 2.** Summary of FV-related systematic reviews in the Cochrane Library up to February 2015

Study	Title
Marinho et al. [2003]	Topical fluoride (toothpastes, mouthrinses, gels or varnishes) for preventing dental caries in children and adolescents
Marinho et al. [2004a]	One topical fluoride (toothpastes, or mouthrinses, or gels, or varnishes) versus another for preventing dental caries in children and adolescents
Marinho et al. [2004b]	Combinations of topical fluoride (toothpastes, mouthrinses, gels, varnishes) versus single topical fluoride for preventing dental caries in children and adolescents
Hiiri et al. [2010]	Pit and fissure sealants versus fluoride varnishes for preventing dental decay
Benson et al. [2013]	Fluorides for the prevention of early tooth decay (demineralized white lesions) during fixed brace treatment
Marinho et al. [2013] <sup>1</sup>	Fluoride varnishes for preventing dental caries in children and adolescents

<sup>1</sup> The review by Marinho et al. [2002] was superseded by this updated revision.

*Marinho VC, Worthington HV, Walsh T, Clarkson JE. Fluoride varnishes for preventing dental caries in children and adolescents. Cochrane Database of Systematic Reviews. 2013(7).*



# SILVER DIAMINE FLUORIDE

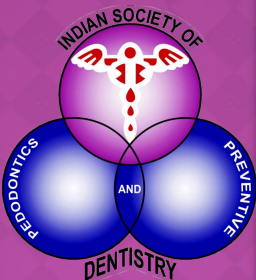
- History
- Mechanism of action
- Indications and Protocol
- Products available
- Scientific evidence for Effectiveness



- *Rosenblatt A, Stamford TC, Niederman R. Silver diamine fluoride: a caries “silver-fluoride bullet”. Journal of dental research. 2009 Feb;88(2):116-25.*
- *Chu CH, Lo EC. Promoting caries arrest in children with silver diamine fluoride: a review. Oral health & preventive dentistry. 2008 Sep 1;6(4).*

# FLUORIDE TOXICITY

- ◉ Dental or system fluorosis
- ◉ Clinical Features
- ◉ Defluoridation
  
- ◉ *Barbier O, Arreola-Mendoza L, Del Razo LM. Molecular mechanisms of fluoride toxicity. Chemico-biological interactions. 2010 Nov 5;188(2):319-33.*
- ◉ *Peckham S, Awofeso N. Water fluoridation: a critical review of the physiological effects of ingested fluoride as a public health intervention. The Scientific World Journal. 2014;2014.*
- ◉ *DenBesten PK. Biological mechanisms of dental fluorosis relevant to the use of fluoride supplements. Community dentistry and oral epidemiology. 1999 Feb;27(1):41-7.*
- ◉ *Ingle NA, Dubey HV, Kaur N, Sharma I. Defluoridation techniques: Which one to choose. Journal of Health Research and Reviews. 2014 Jan 1;1(1):1.*

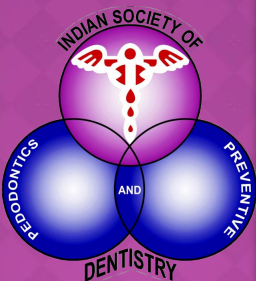


# NON FLUORIDE REMINERALISING SYSTEM

**Table 1. Commercially available calcium phosphate-based remineralization technologies**

Technology	Commercial product	Remineralization claim
Casein phosphopeptide stabilized calcium phosphate (Recaldent™, CPP-ACP)	Trident White sugar-free gum, Recaldent sugar-free gum, Tooth Mousse, MI paste	Recaldent™ (CPP-ACP) a remineralizing ingredient that strengthens teeth by delivering calcium and phosphate to the tooth's surface.
Unstabilized amorphous calcium phosphate (ACP, Enamelon™)	Enamel Care with liquid calcium, Nite White ACP, Day White ACP, Mentadent replenishing white	Rebuilds enamel. The deposition of hydroxyapatite onto teeth rebuilds enamel through a process called remineralization.
Bioactive glass containing calcium sodium phosphosilicate (NovaMin™)	Oravive toothpaste	Nourishes the teeth with essential calcium and phosphorous ions needed for the natural self-repair process of the teeth.

- *Reynolds EC. Calcium phosphate-based remineralization systems: scientific evidence?. Australian dental journal. 2008 Sep;53(3):268-73.*

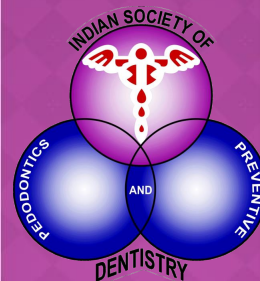


# NON FLUORIDE REMINERALISING SYSTEM

**Table 1.** Non-fluoride enamel remineralizing technologies

Technology	Commercial product
<i>Biomimetic systems</i>	
1 Dentin phosphoprotein 8DSS peptides	Not available
2 P11-4 peptides	Curodont Repair/Curodont Protect
3 Leucine-rich amelogenin peptides	Not available
4 Poly(amido amine) dendrimers	Not available
5 Electrically accelerated and enhanced remineralization	Not available
6 Nanohydroxyapatite	Apagard toothpaste/Desensin oral rinse
<i>Fluoride boosters</i>	
1 Calcium-phosphate systems	
Stabilized calcium phosphates	
- Casein phosphopeptide-amorphous calcium phosphate	Tooth Mousse/MI Paste crèmes Recaldent/Trident White sugar-free gum MI Paste One toothpaste
Crystalline calcium phosphates	
- Functionalized $\beta$ -tricalcium phosphate	ClinPro toothpaste
- Calcium sodium phosphosilicate (NovoMin™ technology)	Oravive toothpaste
Unstabilized calcium phosphates	
- Amorphous calcium phosphate (Enamelon™ technology)	Enamelon toothpaste
2 Polyphosphate systems	Oral-B Pro Expert toothpaste
- Sodium trimetaphosphate	
- Calcium glycerophosphate	
- Sodium hexametaphosphate	
3 Natural products	Not available
- <i>Galla chinensis</i>	
- Hesperidin	
- Gum arabic	

- ◉ Philip N. State of the art enamel remineralization systems: the next frontier in caries management. *Caries research*. 2019;53(3):284-95.





# NATURAL EXTRACTS IN CARIES PREVENTION

Natural product	Active ingredients	properties	References
Green tea extract	Catechin & Epicatechin	<ul style="list-style-type: none"> <li>•Reduce SMs adherence to the surface, inhibits acid production and Gfts activity.</li> <li>•Damage to the bacterial cell membrane</li> <li>•Inhibition of fatty acid synthesis</li> </ul>	Ikigai et al., 1993 Sirk et al., 2008, 2009 Wang and Ma, 2013
Oolong tea extract	Theaflavin	Inhibits insoluble glucan synthesis, mainly aiming at the glucan-binding site of SMs.	Sasaki, H 2004
Cranberry extract	proanthocyanidin oligomers	Reduces biofilm formation, acid production, bacterial adsorption on the tooth surface, glucan synthesis	Koo H et al., 2010
Cocoa extract	Epicatechin, Catechin theobromine	Inhibits Gtf, acid production, bacterial cell adherence, cell growth and promotes remineralization	Ooshima et al., 2000 B.T. Amaechi, 2013

# NATURAL EXTRACTS IN CARIES PREVENTION

Natural product	Active ingredients	Properties	References
Propolis	Flavonoids	Reduces mutans streptococci viability, GTFs activity	Hayacibara et al. (2005)
Grape seed extract	Proanthocyanidin	Reduces biofilm formation, acid production, bacterial adsorption on the tooth surface, glucan synthesis	Swadas M et al., 2016 Jawale et al., 2017
Coffee	chlorogenic acids, Caffeic acid, 5-caffeoylquinic	Antibacterial and remineralization	Antonio, 2011
Root barks of Morus Alba	kuwanon	Displays antibacterial action(SMs, S.sorbinus, Porpyromonas gingivalis, and S.Sanguinis) by arresting cell growth	Alisson Macario de Oliveira et al., 2015

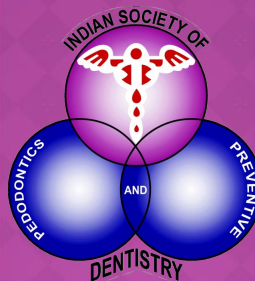
# NATURAL EXTRACTS IN CARIES PREVENTION

Natural product	Active ingredients	properties	References
Onion extract	Flavonoids	Antibacterial activity against SMs, <i>S.sorbrinus</i> , <i>Prevotella intermedia</i> , and <i>Porphyromonas gingivalis</i> .	Kim, 1997
Garlic <i>Allium sativum</i> (Liliaceae) extract	Allicin	Antibacterial activity preferably <i>P. Gingivalis</i> , SMs, <i>Lactobacillus</i> species, <i>E.Coli</i>	Bakri et al., 2005 and Bachrach et al., 2011
Turmeric extract / <i>Curcuma longa</i>	Curcumin & Xanthorrhizol	Inhibit the adhesiveness of <i>S. mutans</i> by its effects on collagen and fibronectin. Exhibit antiadhesion-mediated mechanism effect	Hu et al., 2013
Apple extract	Catechin	Inhibit adherence of <i>S. mutans</i> to tooth surfaces and acid production	Vabitha shetty et al., 2018






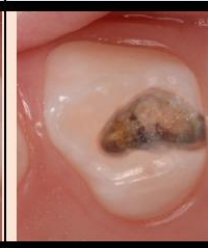






# NATURAL EXTRACTS IN CARIES PREVENTION

Natural product	Active ingredients	properties	References
Droserapeltata leaves extract	Plumbagin	Antibacterial activity against SMs and S. sobrinus.	Didry et al., 1998
Hamamelis virginiana (Hamamelidaceae) Leaves extract	Tannins	Antibacterial activity against Actinomyces odontolitycus, Preveotella, and Porphyromonas species	Linda L. Theisen et al., 2014
Harungana madagascariensis (Hypericaceae) plant leaves extract	Quercetin	Active against fusobacterium, Actinomyces, Prevotella, Streptococcus Lactobacillus, and Propionibacterium	Brice Moulari et al., 2006

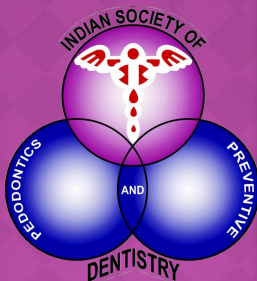
Courtesy: Dr Pushpalatha  
Department of Pediatric and Preventive Dentistry, FDS, RUAS



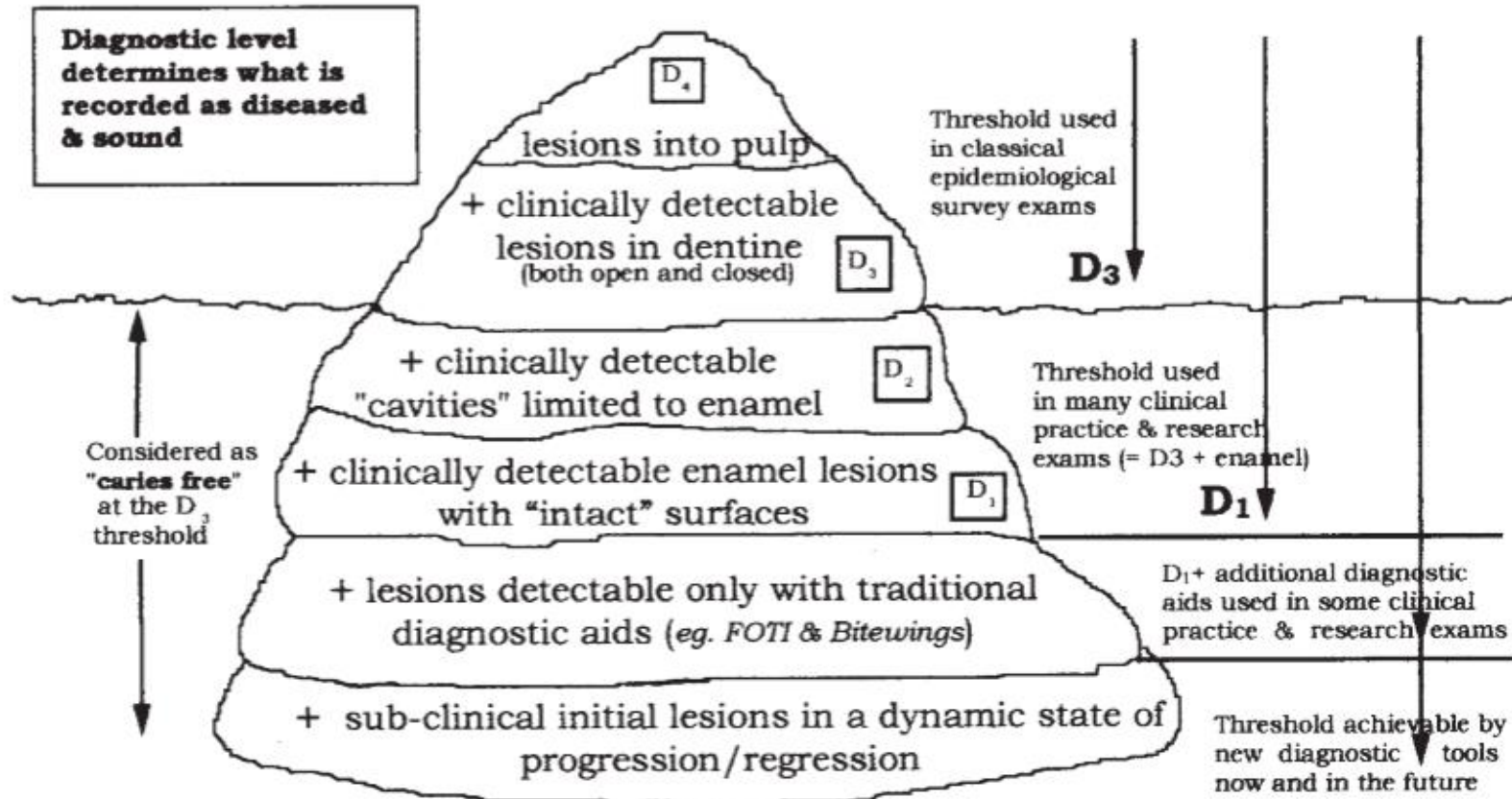
# ICDAS

Occlusal surface description	<ul style="list-style-type: none"> <li>• White/brownish discoloration in the enamel visible after air-drying.</li> <li>• No cavitation.</li> <li>• No radiographic signs of caries</li> </ul>	<ul style="list-style-type: none"> <li>• White/brownish discoloration in the enamel visible without air-drying.</li> <li>• Demineralisation located in the inner ½ of the enamel.</li> <li>• No radiographic signs of caries</li> </ul>	<ul style="list-style-type: none"> <li>• Localized enamel breakdown without visible demineralisation in the dentine</li> <li>• No radiographic signs of dentine involvement</li> </ul>	<ul style="list-style-type: none"> <li>• Underlying dark shadow from dentine</li> <li>• Carious lesion in the outer 1/3 of the dentine according to the radiograph</li> </ul>	<ul style="list-style-type: none"> <li>• Distinct cavity with visible dentine</li> <li>• Carious lesion in the middle 1/3 of the dentine according to the radiograph</li> </ul>	<ul style="list-style-type: none"> <li>• Considerable loss of tooth substance with possible pulpal involvement</li> <li>• Carious lesion in the inner 1/3 of the dentine according to the radiograph</li> </ul>
Primary tooth						
Permanent tooth						

- ◉ *Ismail AI, Sohn W, Tellez M, Amaya A, Sen A, Hasson H, Pitts NB. The International Caries Detection and Assessment System (ICDAS): an integrated system for measuring dental caries. Community dentistry and oral epidemiology. 2007 Jun;35(3):170-8.*
- ◉ *Ismail AI, Sohn W. A systematic review of clinical diagnostic criteria of early childhood caries. Journal of public health dentistry. 1999 Sep;59(3):171-91.*



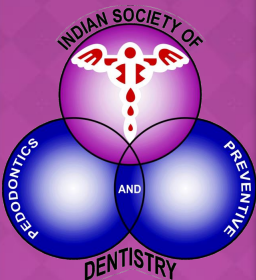
## The "iceberg of dental caries" 2001—varying diagnostic thresholds & applications



DHSRU/2000-1

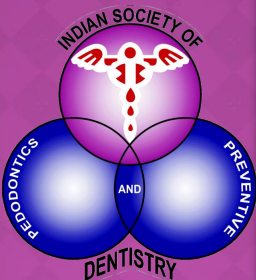
# DENTAL CARIES DIAGNOSIS

- ◉ Classical signs of Dental Caries (traditional)
  - Discolouration
  - Catch on probing
  - Cavitation
  - Softness in texture
- ◉ *Pitts NB. Clinical diagnosis of dental caries: a European perspective. Journal of Dental Education. 2001 Oct 1;65(10):972-8.*
- ◉ *Rosenstiel SF. Clinical diagnosis of dental caries: a North American perspective. Journal of dental education. 2001 Oct 1;65(10):979-84.*



# CARIES DETECTION AIDS

- ◉ Mechanism of action
- ◉ Criteria for caries
- ◉ Diagnostic ability in terms of sensitivity, specificity, false positive and true negative testing
  
- ◉ *Clarkson BH, Exterkate RA. Noninvasive dentistry: a dream or reality?. Caries research. 2015;49(Suppl. 1):11-7.*
- ◉ *Gomez J, Tellez M, Pretty IA, Ellwood RP, Ismail AI. Non-cavitated carious lesions detection methods: a systematic review. Community Dentistry and Oral Epidemiology. 2013 Feb;41(1):55-66.*
- ◉ *Guerrieri A, Gaucher C, Bonte E, Lasfargues JJ. Minimal intervention dentistry: part 4. Detection and diagnosis of initial caries lesions. British dental journal. 2012 Dec;213(11):551.*





# CARIES DETECTION AIDS

- ◉ Diagnodent – Laser fluorescence
- ◉ Calcivis – Photoprotein and Imaging system
- ◉ DiagnoCam/Dexis Carivu – Near InfraRed Imaging
- ◉ FibreOptic Trans Illumination
- ◉ Quantitative light-induced fluorescence
- ◉ Electronic Caries Monitor
  
- ◉ *Pretty IA. Caries detection and diagnosis: novel technologies. Journal of dentistry. 2006 Nov 1;34(10):727-39.*

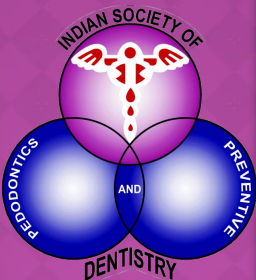
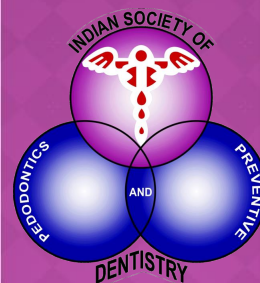


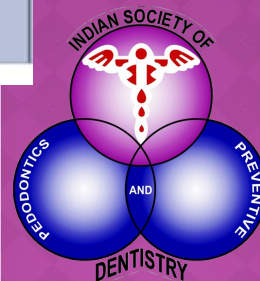
Table 2 Caries management protocol for 0-2-year-olds			
Risk category (ages 0 to 2 years)	Diagnostic		
	Periodic oral exams	Radiographs	Saliva test
Low	Annual	Posterior bitewings at 12-24 month intervals if proximal surfaces cannot be examined visually or with a probe	Optional baseline
Moderate	Every six months	Posterior bitewings at 6-12 month intervals if proximal surfaces cannot be examined visually or with a probe	Recommended
Moderate; non-compliant	Every three to six months	Posterior bitewings at 6-12 month intervals if proximal surfaces cannot be examined visually or with a probe	Required
High	Every three months	Anterior (#2 occlusal film) and posterior bitewings at 6-12 month intervals if proximal surfaces cannot be examined visually or with a probe	Required
High; non-compliant	Every one to three months	Anterior (#2 occlusal film) and posterior bitewings at 6-12 month intervals if proximal surfaces cannot be examined visually or with a probe	Required
Extreme	Every one to three months	Anterior (#2 occlusal film) and posterior bitewings at 6-12 month intervals if proximal surfaces cannot be examined visually or with a probe	Required

*Ramos-Gomez FJ, Crystal YO, Domejean S, Featherstone JD. Minimal intervention dentistry: part 3. Paediatric dental care—prevention and management protocols using caries risk assessment for infants and young children. British dental journal. 2012 Nov;213(10):501.*



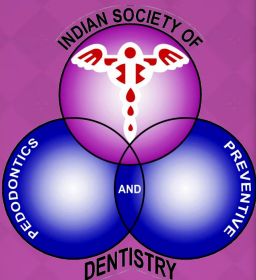
Risk category (ages 0 to 2 years)	Fluoride	Preventive intervention					
		Xylitol	Sealants	Antibacterials	Anticipatory guidance/ counselling	Self-management goals	White spot/precavitated lesions
Low	In office: no Home: brush twice a day w/ smear of F toothpaste	Not required	No	No	Yes	No	n/a
Moderate	In office: F varnish initial visit & recalls Home: Brush twice a day w/smear of F toothpaste Caregiver: OTC sodium fluoride treat- ment rinses	Child: xylitol wipes Caregiver: two sticks of gum or two mints four times a day	Fluoride releasing sealants recommended on deep pits and fissures	No	Yes	No	Treat w/ fluoride products as indicated to promote remineralisation
Moderate; non-compliant	In office: F varnish initial visit & recalls Home: Brush twice a day w/smear of F toothpaste combined w/smear of 900 ppm calcium- phosphate paste leave-on at bedtime Caregiver: OTC sodium fluoride treatment rinses	Child: xylitol wipes Caregiver: two sticks of gum or two mints four times a day	Fluoride releasing sealants recommended on deep pits and fissures	Recommend for caregiver	Yes	Yes	Treat w/ fluoride products as indicated to promote remineralisation
High	In office: F varnish initial visit & recalls Home: Brush twice a day w/smear of F toothpaste combined w/smear of 900 ppm calcium- phosphate paste leave-on at bedtime Caregiver: OTC sodium fluoride treatment rinses	Child: xylitol wipes Caregiver: two sticks of gum or two mints four times a day	Fluoride releasing sealants recommended on deep pits and fissures	Recommend for caregiver	Yes	Yes	Treat w/ fluoride products as indicated to promote remineralisation
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Ramos-Gomez FJ, Crystal YO, Domejean S, Featherstone JD. Minimal intervention dentistry: part 3. Paediatric dental care—prevention and management protocols using caries risk assessment for infants and young children. British dental journal. 2012 Nov;213(10):501.



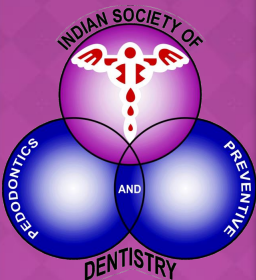
# ESSAY QUESTIONS

- ◉ Enumerate various fluoridated dentifrices available in India along with active topical fluoride agents and their mode of action.
- ◉ Critically evaluate the studies conducted on topical fluorides and possibilities of their application in Indian pediatric population.
- ◉ Elaborate on “ideal vs feasible” use of systemic fluorides in India.
- ◉ Clinically evaluate various clinical trials conducted using duraphat, ammine fluoride and sodium monofluoro phosphate Fluoride varnishes in dental caries prevention
- ◉ Discuss the availability, effect, merits and demerits of systemic fluoride vs topical fluoride.
- ◉ Role of fluoride in teeth remineralization and discuss about latest remineralising agents.
- ◉ Write in detail different types of remineralising agents that can be used in the management of incipient caries Use of fluoride in preventing dental caries
- ◉ Discuss the feasibility of water fluoridation in India
- ◉ Define fluoride toxicity. Explain the etiology, clinical features and management.



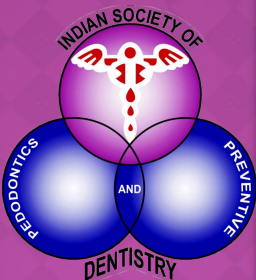
# SHORT ESSAYS

- ◉ Prenatal fluoride supplementation
- ◉ Acute fluoride toxicity
- ◉ Discuss the evolution of topical fluorides.
- ◉ Acidulated phosphate fluoride
- ◉ Fluoride- a double edged sword
- ◉ Role of fluoride in caries prevention
- ◉ Compare fluoride varnish and gels
- ◉ Remineralising agents
- ◉ Preventive resin restorations in children
- ◉ Invasive vs non-invasive pit and fissure sealants
- ◉ Silver diamine fluoride
- ◉ Fluoride supplements
- ◉ Use of pit and fissure sealants in pediatric dentistry.
- ◉ Classification of pit and fissure sealants



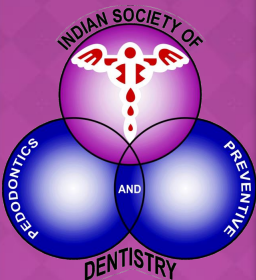
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- Fejerskov O. Changing paradigms in concepts on dental caries: consequences for oral health care. *Caries research*. 2004;38(3):182-91.
- Tsang P, Qi F, Shi W. Medical approach to dental caries: fight the disease, not the lesion. *Pediatric dentistry*. 2006 Mar 1;28(2):188-91.



# TAKE HOME MESSAGE

- ◉ Read, Read and Read the Question Paper
- ◉ Understand the requirements of the question
- ◉ Plan your answer
- ◉ Draw up your blueprint for the answer
- ◉ Apt References and underline
- ◉ Introduce the answer
- ◉ Summarise the conclusion



# THANK YOU

